Portion **200** includes an electrically-insulating substrate **202**, an insulation layer **204**, counter electrode exposed portion **206**, first working electrode exposed portion **208**, second working electrode exposed portion **210** and enzymatic reagent layer **212**. The composition of enzymatic reagent layer **212** and the method by which it was applied are described in U.S. Pat. No. 5,708,247, which is hereby fully incorporated by reference. **FIG. 9** indicates that enzymatic reagent layer **212** is uniform and fully adhered to counter electrode exposed portion **206**, first working electrode exposed portion **208**, second working electrode exposed portion **210**. In addition, it was determined that enzymatic reagent layers disposed on an electrode surface with hydrophilicity-enhancing moieties were robust to physical manipulation that occurs in conventional test strip manufacturing processes.

[**0065**] Hydrophilicity-enhancing moieties were disposed on counter electrode exposed portion **206**, first working electrode exposed portion **208**, second working electrode exposed portion **210** by submerging them in a 4 g/L aqueous solution of MESNA for 2 minutes followed by a water rinse. This exposure occurred prior to the application of enzymatic reagent layer **212**.

[**0066**] **FIG. 10** is a chart of current response versus YSI determined glucose concentration for an electrochemical-based analytical test strip with gold metal electrodes that have hydrophilicity-enhancing moieties on their upper surface of the gold electrodes (i.e., electrochemical-based analytical test strips corresponding effectively to the depiction of **FIG. 9**). The best fit line and R^2 value for the data of **FIG. 10** are indicated on the chart. The data and R^2 value of **FIG. 10** are an indication of the repeatability and accuracy of measurements made with the electrochemical-based analytical test strip with gold electrodes.

[**0067**] A comparison of **FIGS. 10 and 8** indicates that the repeatability and accuracy of electrochemical-based analytical test strips that employ a metal electrode with hydrophilicity-enhancing moieties on an upper surface of the metal electrode are superior to a comparison electrochemical-based analytical test strip with metal electrodes in the absence of such hydrophilicity-enhancing moieties. For example, the R^2 for the date of **FIG. 10** is 0.9985, a significant improvement over the R^2 value of 0.774 for the data of **FIG. 8**.

[**0068**] **FIG. 11** is a flow chart of a process **400** for manufacturing a portion of an electrochemical-based analytical test strip according to an exemplary embodiment of the present invention. Process **400** includes forming at least one metal electrode (e.g., a gold metal, palladium metal or platinum metal electrode) on a surface of an electrically-insulating substrate with the at least one metal electrode having an upper surface, as set forth in step **410**.

[**0069**] Subsequently, the upper surface of each of the at least one metal electrodes is treated with a hydrophilicity-enhancing composition to form a treated upper surface of the metal electrode with hydrophilicity-enhancing chemical moieties thereon, as set forth in step **420**. The treatment can be accomplished using, for example, any suitable treatment technique including dip coating techniques, spray coating techniques, and inkjet coating techniques. Any suitable hydrophilicity-enhancing composition can be employed including those described above with respect to electrochemical-based analytical test strips according to the present invention.

[**0070**] The following two examples are illustrate, in a non-limiting manner, treatment technique sequences that can be employed in treatment step **420** of process **400**:

TREATMENT EXAMPLE 1

[**0071**] (a) clean upper surface of the metal electrode(s) by placing them in a 2% v/v aqueous solution of degreasant (e.g. Micro-90®) for 2 minutes at room temperature.

[**0072**] (b) Rinse the metal electrodes with water to remove excess degreasant.

[**0073**] (c) Dip the metal electrodes into a 4 g/L aqueous solution of MESNA) for two minutes.

[**0074**] (d) Rinse the metal electrodes with water to remove excess aqueous solution.

[**0075**] (e) Dry the metal electrodes in a clean environment.

TREATMENT EXAMPLE 2

[**0076**] (a) Place the metal electrodes into an ultrasonic bath with an aqueous solution containing 2% v/v degreasant (e.g. Micro-90®) and 4 g/L MESNA).

[**0077**] (b) Sonicate the two minutes in an ultrasonic bath at a temperature of 50° C.

[**0078**] (c) Rinse the metal electrodes with water to remove excess degreasant and MESNA.

[**0079**] (d) Dry the metal electrodes.

[**0080**] Thereafter, at step **430** of process **400**, an enzymatic reagent layer is applied to the treated upper surface of the at least one metal electrode.

[**0081**] It should be understood that various alternatives to the embodiments of the invention described herein may be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that structures and methods within the scope of these claims and their equivalents be covered thereby.

What is claimed is:

1. An electrochemical-based analytical test strip comprising:

an electrically-insulating substrate;

at least one metal electrode disposed on a surface of the electrically-insulating substrate, the metal electrode having:

an upper surface with hydrophilicity-enhancing chemical moieties thereon, and

an enzymatic reagent layer disposed on the upper surface with hydrophilicity-enhancing moieties thereon.

2. The electrochemical-based analytical test strip of claim 1, wherein the at least one metal electrode is formed from at least one of gold, palladium, platinum, indium, titanium-palladium alloys and combinations thereof.

3. The electrochemical-based analytical test strip of claim 1, wherein the hydrophilicity-enhancing moieties include a thiol group.